BETTER NEST BOXES for WOOD DUCKS

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Most wild ducks nest on the ground, but the wood duck, or summer duck, normally nests in tree cavities. This helps explain why the number of wood ducks dropped severely during the past century, when heavy cutting of mature timber destroyed many natural nesting sites. It also indicates why artificial nesting sites can be of practical value in many places.

The possibility of increasing wood-duck populations by means of nest boxes depends mostly upon the quality of habitat in the bird's diverse breeding range (largely the eastern half of the United States and the Pacific Coast States south to central California). In many areas, suitably erected nest boxes have proved effective. The Illinois Natural History Survey pioneered in work with nest boxes, and the Massachusetts Division of Fisheries and Game also has done considerable research and has erected thousands of boxes. Other States, private groups, and individuals have helped to restore wood-duck numbers by providing artificial nesting sites.

USE OF NEST BOXES BY OTHER ANIMALS

Success with wood-duck nest boxes is complicated by the fact that the boxes are attractive to various kinds of wildlife, some welcome and others not. Desirable or largely unobjectionable species which nest in the boxes include goldeneyes, hooded mergansers, screech owls, sparrow hawks, bluebirds, tree swallows, and great crested flycatchers. Competition of these species with wood ducks is generally slight and usually can be eliminated by erecting more boxes.

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Other occupants or visitors can be objectionable; boxes not only must be suitable for use by wood ducks but also should exclude their enemies. Raccoons are by far the most important predators. They consume many eggs and occasionally kill incubating ducks. Raccoons may not visit vulnerable nest boxes the first year or two after they are put up, but sooner or later one of them will investigate and discover a nest of eggs. Thereafter, he will seek eggs in each box he finds. Wood-duck eggs also have been destroyed by fox squirrels, bull snakes, rat snakes, and mink. The mink may occasionally prey on incubating ducks. Starlings, white-footed mice, and various species of tree squirrels may fill the boxes with their nests and thus prevent the ducks from using them. In many areas starlings are the worst competitors for nest boxes, and quite often one will build a bulky nest directly over a clutch of wood-duck eggs. Occasionally raccoons and opossums use boxes as dens, and bees use them as hives.

PREDATOR-PROOFING NEST BOXES

Biologists have recognized for some time that under certain circumstances nest boxes can be liabilities to wood ducks rather than assets. When the boxes merely make wood-duck eggs more available to predators, erecting them does more harm than good. Many persons have been discouraged with the results of their nest-box programs, and feel that their time and money were wasted. For this reason much effort has been directed toward predator-proofing the boxes. Early attempts in this direction were concentrated on adaptations such as oval entrances or tunnel entrances on the conventional wooden boxes. In some regions these have served the purpose effectively, but they have not been uniformly successful in all parts of the country. Recently, methods have been devised which appear to be useful in areas where entrance guards have failed. These employ metal boxes with metal supports. An older method, now coming into wider use, relies on large metal shields to protect boxes mounted on wooden posts.

Predator-proofing wooden nest boxes.--The Illinois Natural History Survey (Bellrose, 1955) found that in Illinois an elliptical opening, 3 inches high and 4 inches wide, admitted wood ducks but excluded raccoons. However, raccoons sometimes gained entrance by gnawing the hole larger. This was largely corrected by masking the opening with a piece of galvanized sheet metal, about 6 inches high and 12 inches across, with a 3- by 4-inch elliptical hole in the center (fig. 1).

Another method of preventing raccoons from entering nest boxes was developed by the Massachusetts Division of Fisheries and Game (McLaughlin and Grice, 1952). This consists in equipping boxes with wooden entrance tunnels which are 4 by 4 inches on the inside and 10 inches long (figs. 1 through 4). This type of entrance guard has effectively excluded raccoons in that State during 7 years of use on several hundred boxes. Wooden tunnels 3 inches high and cylindrical metal tunnels that would effectively deter raccoons were also tried in Massachusetts, but both reduced use of the boxes by ducks. Results of an experiment conducted in Rhode Island

(Cronan, 1957) "seem to indicate that, when hen wood ducks have a choice, they prefer to nest in boxes without [wooden-tunnel] guards. However, when all the boxes in a given area have guards or when nesting pressure is high, the predator guards used in this project did not appear to affect the usage of wood duck boxes."

In Maryland, both tunnels and oval entrances have failed to prevent raccoons from destroying many wood-duck nests. There is some evidence that raccoons in Maryland are smaller than those in Massachusetts and northern Illinois and can pass through a 4- by 4-inch tunnel or a 3- by 4-inch hole. Along with many other warm-blooded animals, raccoons tend to be smaller in warmer climates, and in our southern States a large percentage of these animals may be able to pass through entrance guards. Tests in Maryland have shown that some raccoons, weighing around 10 pounds, can enter the tunnel but not the oval entrance. Of course, smaller predators, such as mink, fox squirrels, and snakes, can enter boxes readily through these guards. In areas where guards do not prevent nest destruction, other precautions must be taken to prevent predators from reaching the entrances. Merely erecting boxes over water or on metal posts, or hanging them on wire stretched between two trees, is no guaranty that raccoons will not reach and enter them.

Tree-mounted boxes were successfully protected from raccoons and fox squirrels in Illinois (Bellrose, 1955) by the application of broad bands of "Tanglefoot," a sticky substance used to prevent insect larvae from crawling up trees. To be effective, however, the protective band must be renewed each year just before the nesting season, and for this reason its use is practical only where a few easily visited boxes are involved. "Tanglefoot" will not deter rat snakes.

Probably the most satisfactory means of preventing predators from entering a wooden nest box is to place a large cone-shaped, sheet-metal guard (figs. 5 and 6) around the mounting post. The guard should fit the post tightly enough to keep snakes from squeezing through. The cost of the guard per box can be reduced by mounting two boxes on one pole, or as many as 6 boxes on crossbars between paired poles, as has been done in Vermont (fig. 5). According to biologist William R. Miller of the Vermont Fish and Game Service, these guards have protected wood ducks not only from raccoons but also from mink, which destroyed nests in unprotected boxes nearby.

Predator-proofing metal nest boxes.--To exclude fox squirrels from nest boxes mounted on trees, the Illinois Natural History Survey developed a cylindrical, sheet-metal box with a steep, conical lid (Bellrose, 1955). When this box is properly constructed and mounted against a tree trunk away from limbs, squirrels can rarely reach the entrance -- either from the side or over the steep roof. Raccoons, however, can easily reach the peak of the roof, grasp it with their feet, and lower themselves headfirst to the entrance (fig. 12).

Wherever the 3- by 4-inch oval entrance excludes raccoons successfully, it is the simplest and cheapest method to use. But where it is unsuccessful, as in Maryland, or where a larger hole is used to permit easy passage of wood ducks or goldeneyes, the metal box is not predator-proof. Two methods of erecting the metal box have proved successful in preventing raccoons from reaching the entrance. One method is for mounting boxes on posts, and the other is for mounting them on trees.

When the box is mounted on a post, it should be bolted snugly to a steel "U" post as shown in figures 7 and 8. It is important that there be no gaps to provide claw holds where the edges of the post touch the box. For the same reason, all extruded fasteners on the post must be hammered back into place with a sledge sufficiently to close all openings. No backing board should be used between the box and post, since this provides a means by which a raccoon can climb to the top of the box (fig. 12). When the box is properly mounted, a raccoon can easily climb upward to the bottom of the box but can go no farther. Since squirrels, too, are unable to reach the roof of an isolated box mounted in this manner, a cone-shaped lid is not required. A flat, piepan type of lid is adequate and is easier to make (fig. 7).

If the box is mounted on a tree, special brackets can be used (fig. 7 and 9). This technique has proved satisfactory in Maryland. Wood ducks readily used these boxes and brought off broods, even though nearby nests in boxes with entrance guards were destroyed by raccoons. The box should be located so that the tree trunk does not lean towards it. In localities where raccoons are quite large, it may be necessary to set the box a couple of inches higher on the bracket and farther out from the tree to prevent animals from reaching either up or out to the peak of the roof.

CONSTRUCTING NEST BOXES

Constructing wooden nest boxes.--Many persons erect wooden nest boxes because they believe they are easier and cheaper to build than metal ones. This may be true when nail kegs or ammunition boxes are converted into nest boxes, but the usefulness of these boxes as suitable nesting sites is of such short duration that they hardly justify the time required to make and erect them. Construction of good wooden boxes takes less skill but more time than good metal ones, and labor costs are likely to be higher. Also, wooden boxes with the durability of metal ones may cost more for the materials. Nevertheless, for those who wish to build wooden boxes the following information is given.

Easily constructed boxes are shown in figures 1 and 2. Inside, the boxes are 10 inches wide and 10 inches from front to back. Boxes with the tunnel entrance guard should be about 18 inches high. Those with the oval entrance should be at least 18 to 20 inches high. In both, the hole should be near the top to prevent raccoons from reaching the eggs with their paws.

Board boxes protected by a conical, sheet-metal guard on the mounting post should be about 18 inches high. Wood ducks prefer the deeper boxes to shallow ones.

Construction of a specially designed duplex box is shown in figures 3 and 4. It is suitable for use in regions where either tunnels or oval entrances will exclude raccoons. This box is mounted on two steel posts; the two vertical wooden strips on each side are spaced to accommodate the particular type of post used. It is easily erected by driving two 8- to 12-foot steel posts a foot apart, lifting the box into place and twisting the wires tightly over the posts. The box is self-balanced to ease strain on its supports. In Maryland, raccoons entered these boxes in spite of the reduced height of the entrance midway of the tunnel (fig. 4).

The following suggestions will help in the construction of wooden boxes:

(1) Use either dressed or rough-sawed, 1-inch boards of well-seasoned wood. Pine is satisfactory but is not as lasting as cypress.

(2) Use nails that are long enough to hold securely despite rough handling and weathering. Eight- or ten-penny nails are satisfactory. Coated box-nails will last 5 or 6 years. Use galvanized nails if the box is made of cypress wood or is treated with a preservative. Fasten a loop of No. 12 galvanized, steel wire tightly around the box for additional strength.

(3) Bore four 1/4-inch drainage holes through the bottom of the box.

(4) If the inside surface of the front board is smooth, as it will be if dressed lumber is used, tack a strip of fine hardware cloth about 3 inches wide from the bottom of the box to the entrance hole. This will help ducklings climb from the nest.

(5) Treat pine or other less durable woods with a preservative to make them more lasting. A clear preparation containing pentachlorophenol is very satisfactory for all surfaces, or a creosote type of preservative is suitable for the bottom. Pentachlorophenol may be obtained in preparations sold under various trade names and will be listed on the label as the active ingredient. It is especially important to treat the areas which generally rot out the quickest. These include the bottom, the part of the back that will be adjacent to the post, and the area inside that will be covered with nesting material. Preservative-treated boxes should be well dried before they are made available to nesting ducks.

(6) Do not use creosote or any other dark coating on the roof or outside walls. It was formerly believed that old, weather-stained boxes are more attractive to wood ducks, but more recent evidence shows that conspicuous, new boxes are more readily accepted, probably because they

are more easily seen. An additional advantage is that a light-colored box absorbs less heat from the sun.

Constructing metal nest boxes.--The metal box (figs. 7 through 11) consists of a sheet-metal cylinder 11 or 12 inches in diameter and 24 inches high, a bottom of either wood or sheet metal, and a steep, cone-shaped, sheet-metal roof. Either 26-gauge galvanized sheet metal or 12-inch diameter galvanized furnace-piping or cold-air duct may be used. Complete details of layout and construction are given in the circular by Bellrose (1955).

If a metal "U" post or metal bracket is used to erect the box, the shape of the entrance hole is then unimportant; it can be either round or square (fig. 10).

The lid can be attached by either of two methods. One method involves the use of mating catches which are formed in the lid and top edge of the cylinder, as shown in figure 11. A pair of these locking arrangements on opposite sides attaches the roof securely and yet permits easy removal. In the second method, a metal screw is fastened permanently in the lid (fig. 11) and hooks into a slightly oversize hole in the upper edge of the cylinder. Opposite this, a piece of No. 9 wire, shaped like a hook, is inserted into matching holes in lid and cylinder. The inside leg of the wire hook should be long enough to keep it hanging downward but not long enough to obstruct the entrance, if it should happen to swing into that position. The outside leg should be shorter and the end bent out to make it easy to insert and remove the hook.

Some material must be provided inside the nest box, from floor to entrance, which will enable the ducklings to climb out. Automobile undercoating is satisfactory if it is properly applied. Bellrose (1955) suggests mixing a sufficient amount of vermiculite (a mica material used for building insulation) with the undercoating to produce a stiff, doughlike mixture. The undercoating should be applied one-quarter to one-half of an inch thick in a band at least 4 inches wide. Permanent toenail holds can be made for the ducklings by scoring numerous, narrow, horizontal grooves in the undercoating with a trowel. When making the grooves, the trowel should be held with the point slanting downward at a slight angle. The bottom of the box should be provided with four 1/4-inch drainage holes, and if wooden, it should be treated with a preservative. The floor can be protected from water run-off by allowing the metal walls to extend half an inch beyond the bottom board.

Soon after erection, boxes of galvanized metal become dull and when exposed to the sun they absorb considerably more heat than wooden ones. This can be corrected by painting them aluminum, which also increases their durability. In order to apply certain aluminum paints over galvanized metal, a zinc chromate undercoat is required. Limited tests indicate that

the bright aluminum paint does not deter wood ducks from nesting.

Satisfactory nest boxes can be made from 100-pound grease drums, which generally can be obtained from garages or gas stations. All remaining grease should be burned out or removed with a jet of steam. The latter is preferable since it does not destroy the protective paint coating. The entrance can be cut with an acetylene torch or with hammer and cold chisel. Rough edges should be bent over. Undercoating should be provided so ducklings can climb out.

LOCATING AND ERECTING NEST BOXES

In order to attract wood ducks, boxes must be suitably placed as well as properly constructed. Good visibility is especially important in attracting ducks to nest boxes. Boxes erected over water are often more successful than those placed at a distance from the water. They should be placed so that the entrance will be conspicuous to birds using the water area. The front of the box should never be obstructed by nearby vegetation.

Trees or stout snags surrounded by water during the nesting season are good sites for nest boxes. Shoreline trees are satisfactory also, but if they are accessible to squirrels, metal boxes should be used. Boxes should be high enough to avoid flooding by high water.

In parts of Illinois, wood ducks have nested in boxes as far as half a mile from water. The boxes were located in relatively open, mature, upland hardwoods, where they were placed about 15 feet above the ground on trees at least a foot in diameter. In general, however, it was found advisable to erect boxes no farther than a quarter of a mile from water. More complete instructions for locating and erecting nest boxes are given in the circular by Bellrose (1955).

In general, it is recommended that only a few nest boxes be established in an area during the first year. Then, if wood ducks do not use them, little time or money has been lost. But if the ducks do accept them for nesting and the breeding population increases, more boxes can be erected as they are needed.

Deep boxes should be installed in a position as nearly vertical as possible since backward tilt may prevent ducklings from climbing out. For fastening boxes or brackets to wooden posts or trees, either lag screws or hanger bolts, from 3 to 5 inches long as may be required, are preferable to spikes. These fastening devices make it easier to remove boxes when necessary and also permit adjustment to growth of trees to which boxes are attached. A flat washer should be placed under the head of each screw or bolt used to fasten boxes (but not brackets or metal posts) to wooden supports.

Erecting posts.--In areas where there is little chance of extremely high floods or movement of heavy ice, boxes can be fastened to steel posts or to cedar or locust posts sunk into marshes or pond bottoms. If the bottom is firm, steel posts are satisfactory and are easier to install than are wooden posts. If the bottom is mucky, a crosspiece should be bolted or riveted to the post about 3 feet above its base to prevent it from sinking deeper. Steel posts will last much longer if they are fastened above water to well-set wooden posts or to sound stumps of well-rooted trees (fig. 8). This is especially true in acid or brackish waters, which accelerate rusting.

To sink wooden posts into a firm bottom it is easiest to use a rotary-type posthole digger and wedge the post tightly in place with stones or stout stakes driven in around the base. In soft, muddy, or mucky bottoms, as in marshes, the posts can usually be driven or twisted in.

Two methods of sinking poles have been used successfully in New England in winter when ice is thick. In both methods, a hole, slightly larger than the pole to be erected, is cut through the ice. A pole about 14 feet long, with one end sharpened, is stood upright in the hole and first is forced by hand as far into the soft bottom as possible.

One method of forcing the pole deeper into the marsh was suggested by David Grice of the Massachusetts Division of Fish and Game. A second pole is fastened horizontally to the upright one with a light log chain. Two men stand on the crossbar to add weight, and a third man, holding onto the end of the crossbar, walks in a circle until the upright has sunk to the proper depth.

A second method was devised more recently by Robert Fuller of the Vermont Fish and Game Service. After the pole is set in place through the ice, a Jeep with rear-end winch is backed into place against the pole. A cable from the winch is fastened to the top of the pole which is then pulled straight downward into the marsh bottom by the winch and weight of the Jeep.

NESTING MATERIAL

Since wood ducks carry no nest material, about 3 inches of sawdust or shavings should be put in the box. This is used by the birds to cover their eggs during the laying period and serves as a substitute for decaying wood usually found in natural nest cavities. William R. Miller of the Vermont Fish and Game Service reports that starlings will often remove shavings from a box but are not so prone to remove sawdust. Since sawdust by itself tends to pack, a mixture of sawdust and shavings generally is more satisfactory.

SOME IMPORTANT CONSIDERATIONS

Nest boxes do more harm than good under certain circumstances. This should be recognized clearly by individuals and organizations planning either limited or extensive programs of nest-box establishment. A worse-than-nothing circumstance results when predators destroy eggs laid by ducks attracted to boxes. In one instance, raccoons destroyed eggs in 20 out of 24 nests and killed an incubating wood duck on 1 of the 4 remaining nests. It would have been better if such ineffective nest boxes had not been erected.

Boxes also fail to fulfill their purpose if they are not maintained properly. They should be inspected at least once a year, preferably shortly before the birds return to nest. At this time necessary repairs can be made, debris can be cleaned out, sawdust and shavings loosened, and fresh material added as needed.

It costs very little more to build a good nest box that will last 10 to 15 years than it does to build one that will last only 3 to 5 years. Durable, predator-proof boxes erected in carefully selected sites produce more ducklings and are well worth the small amount of extra work and expense.

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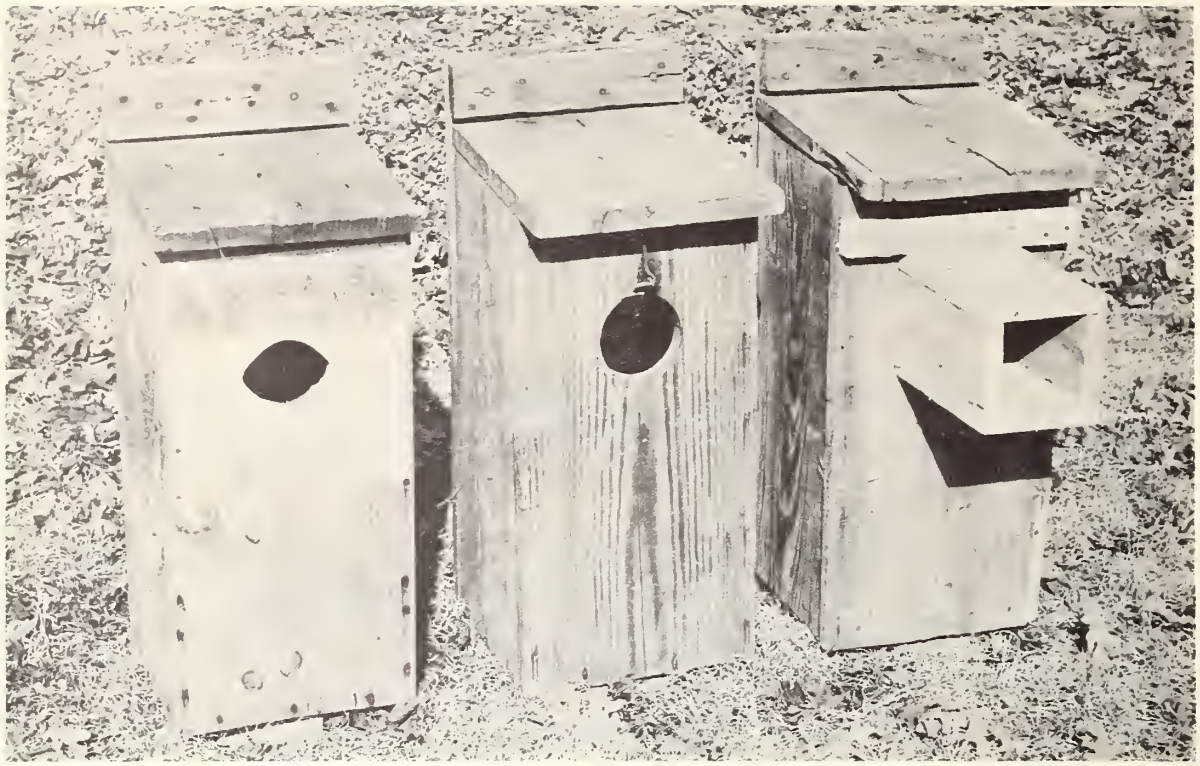

Fig. 1. Common types of nest box entrances. The oval entrance at left and tunnel at right have proved successful in excluding raccoons in the North but have not been uniformly satisfactory in the South. The center box is seldom raccoon-proof anywhere.

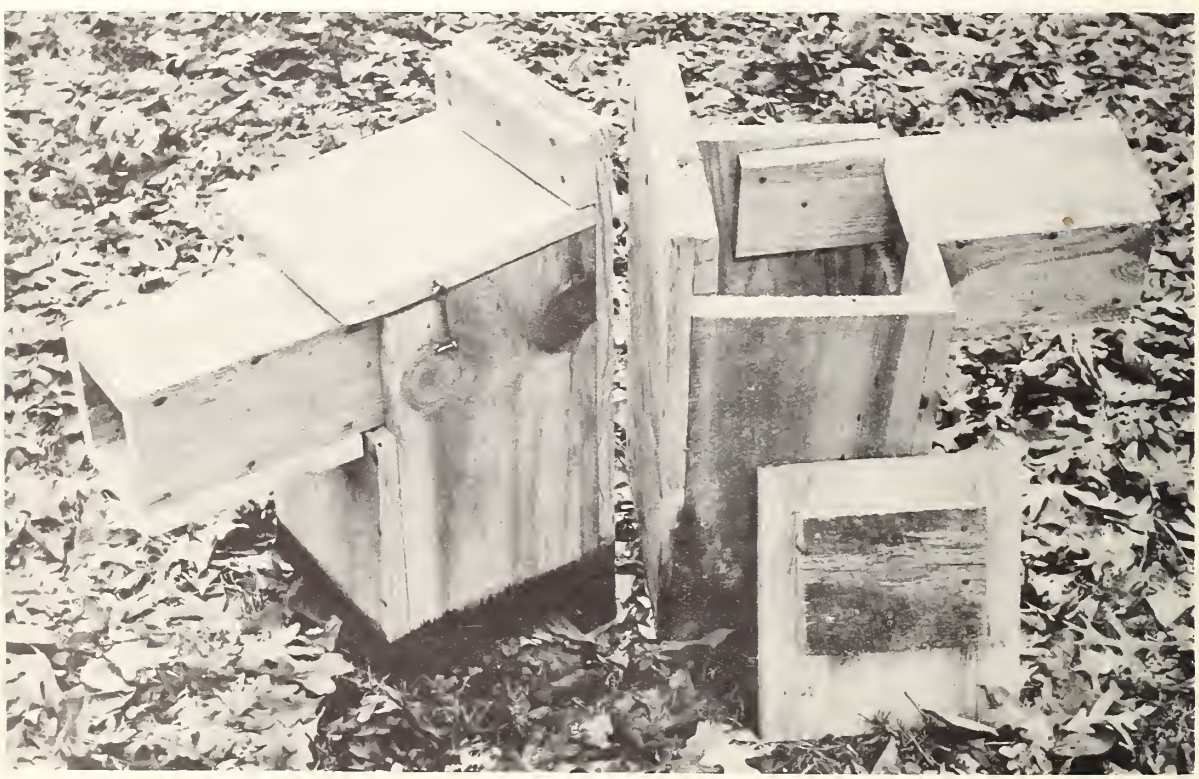

Fig. 2. Views of nest box with tunnel entrance built in.

Fig. 3. The duplex box is cheaper to construct than two single boxes. It is easily erected on two metal posts. Placing the box over water does not assure security from most predators.

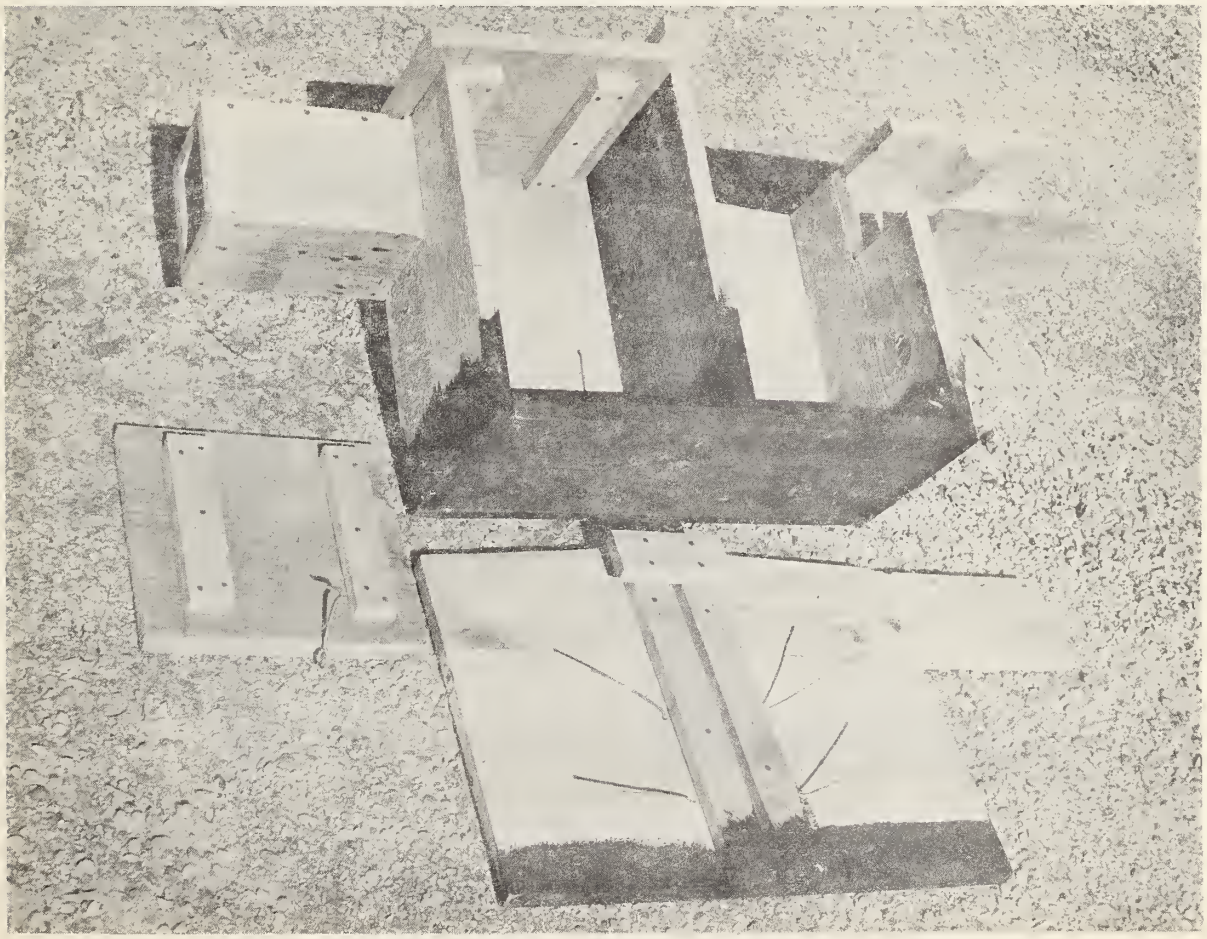

Fig. 4. Construction details of duplex nest box. Either oval or tunnel entrances can be used.

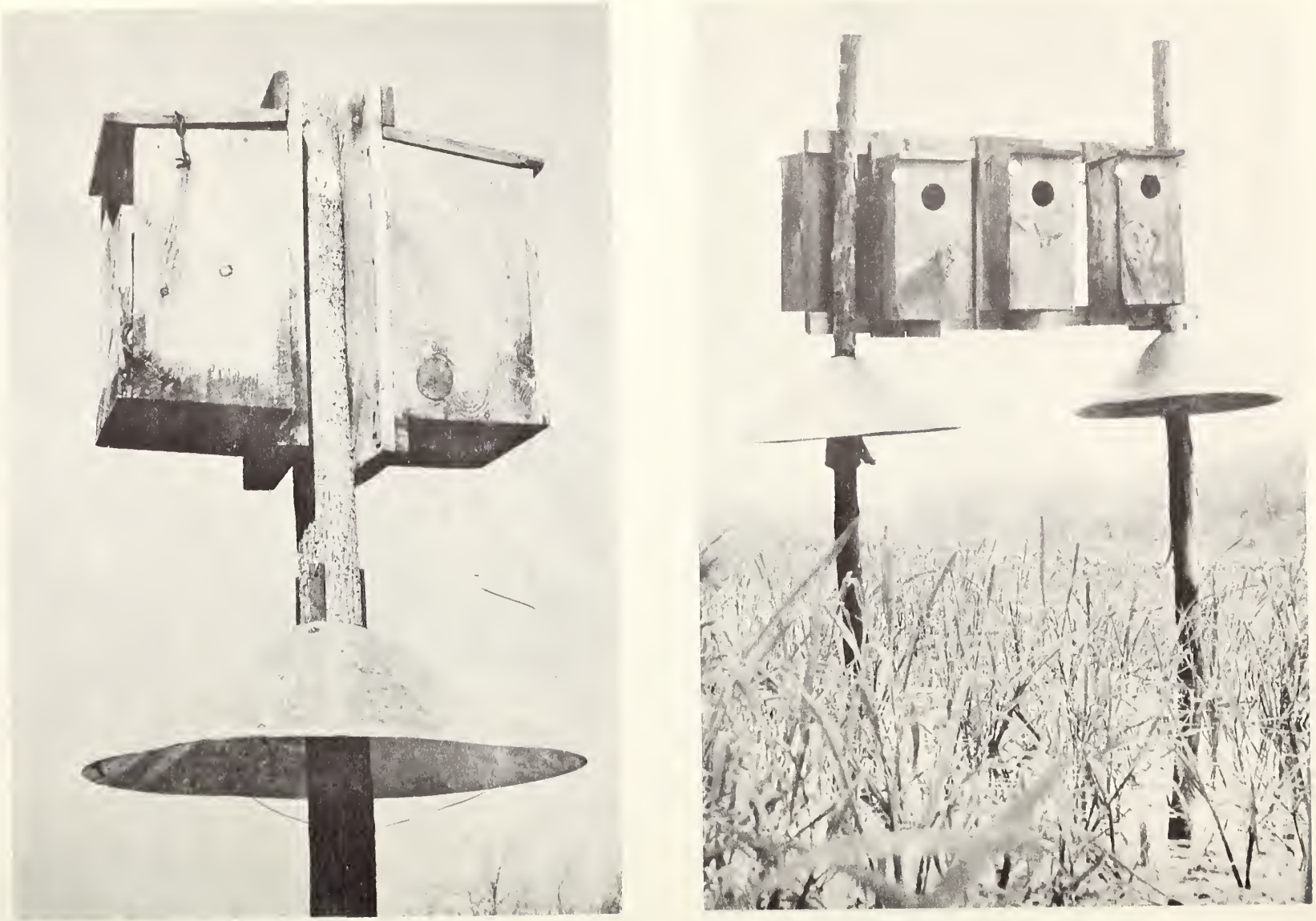

Fig. 5. Wooden boxes protected by predator-proof guards. The use of two or more boxes per shield reduces the cost of shield per box.

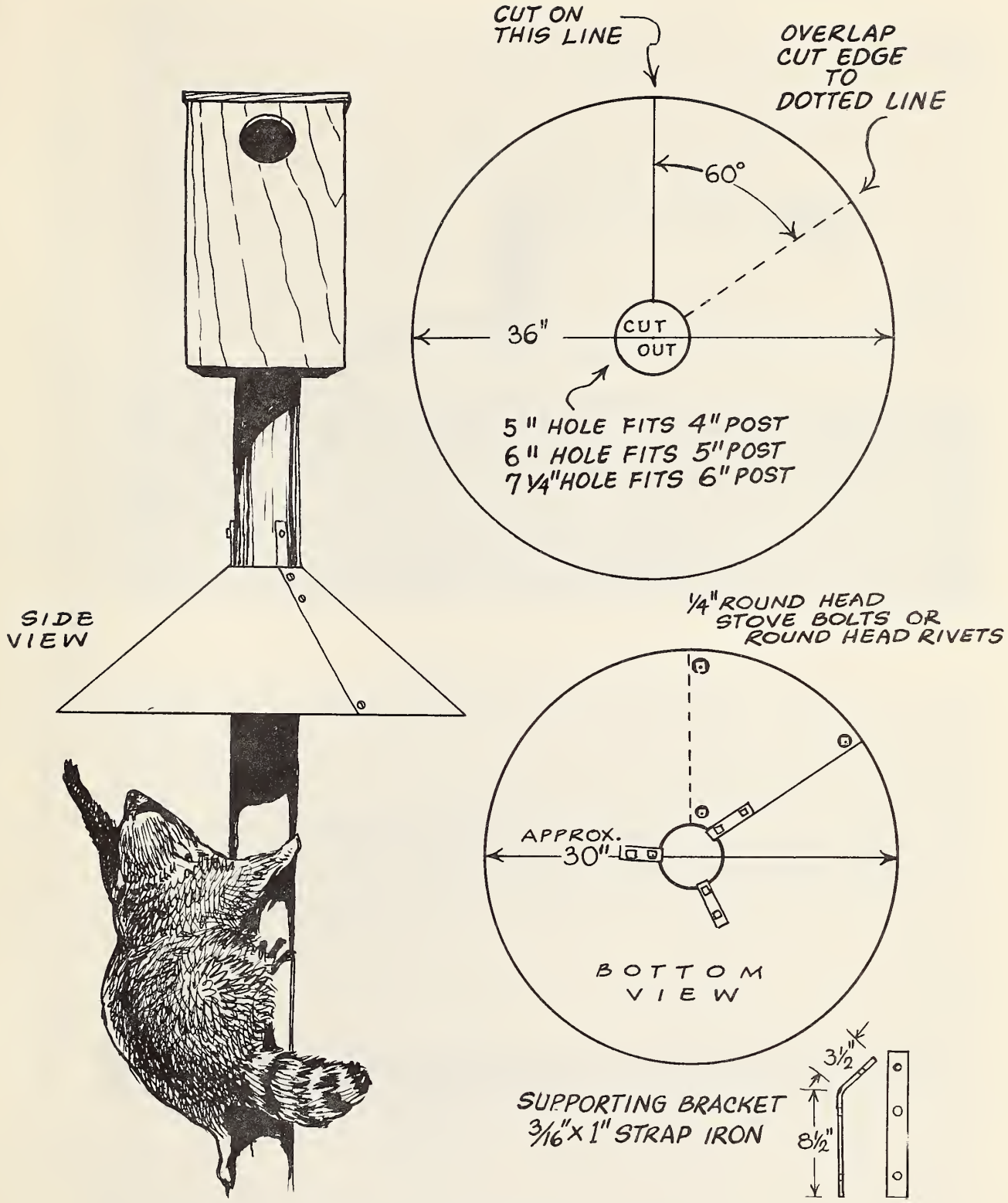

FIG. 6. SHEET METAL GUARD

FOR PROTECTING WOODEN NEST BOXES FROM PREDATORS.

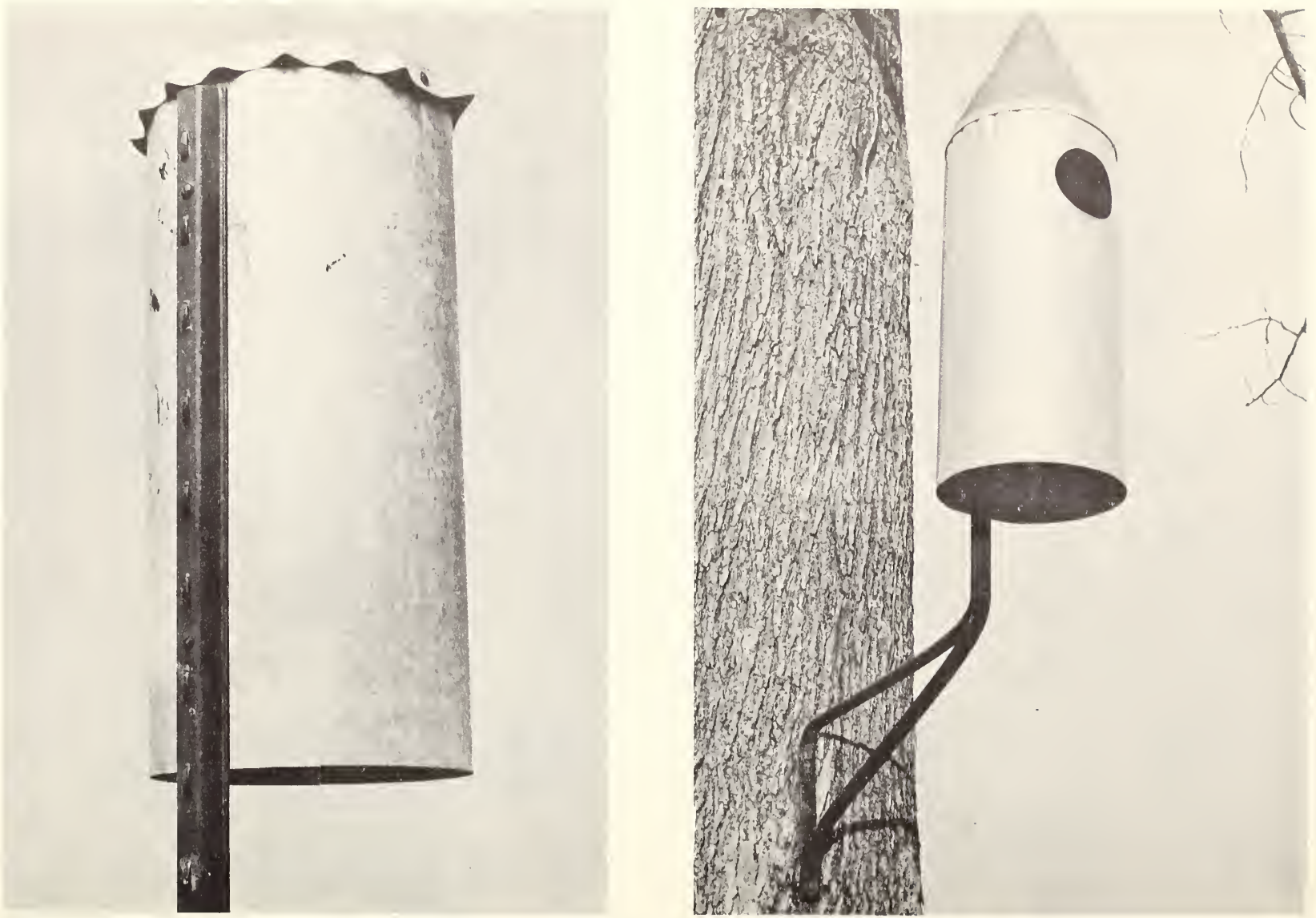

Fig. 7. Metal nest boxes can be predator-proof if they are supported in either of the two ways illustrated. Raccoons can climb to the nest box but cannot reach the entrance.

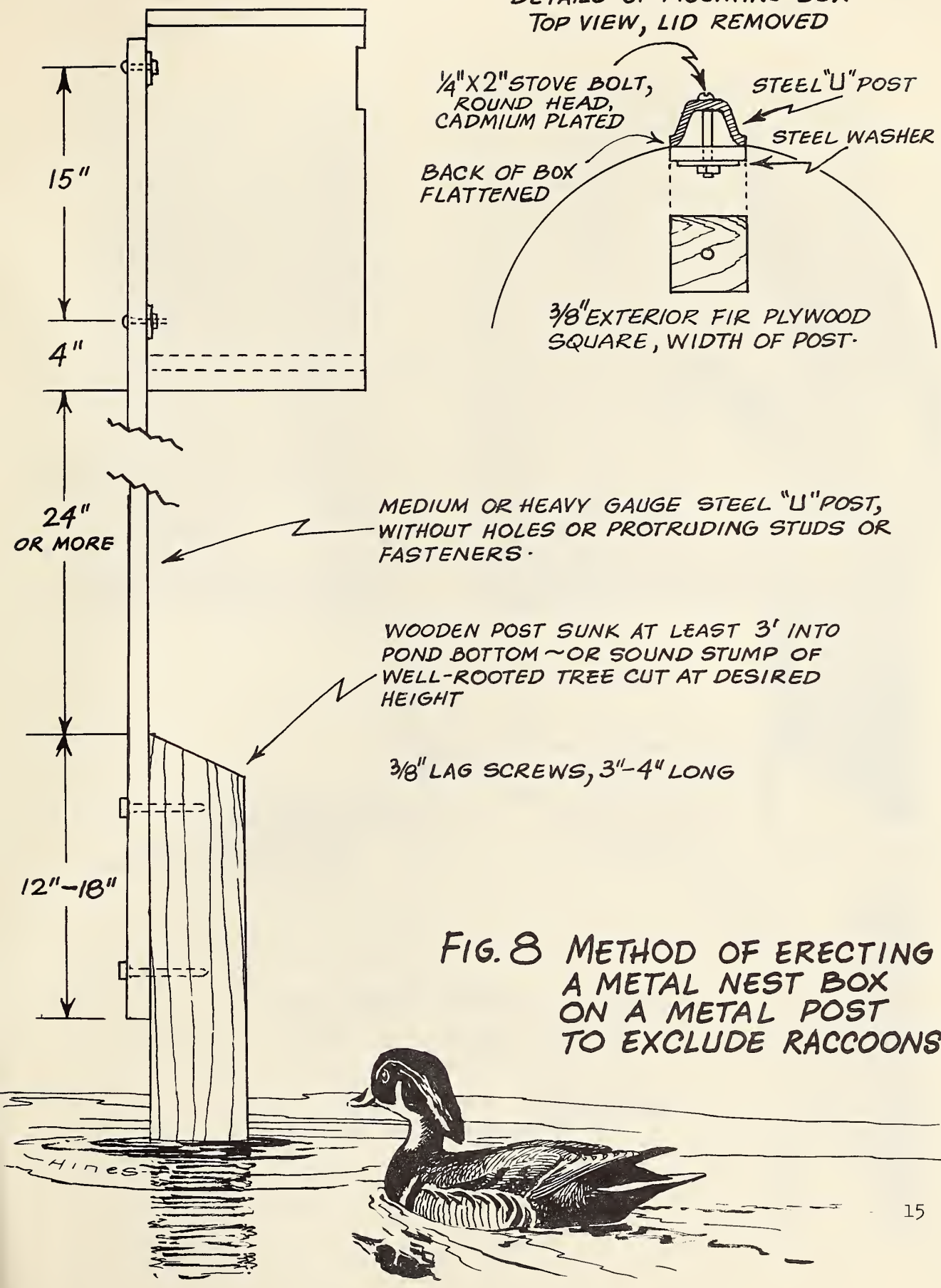

FIG. 8 METHOD OF ERECTING A METAL NEST BOX ON A METAL POST TO EXCLUDE RACCOONS.

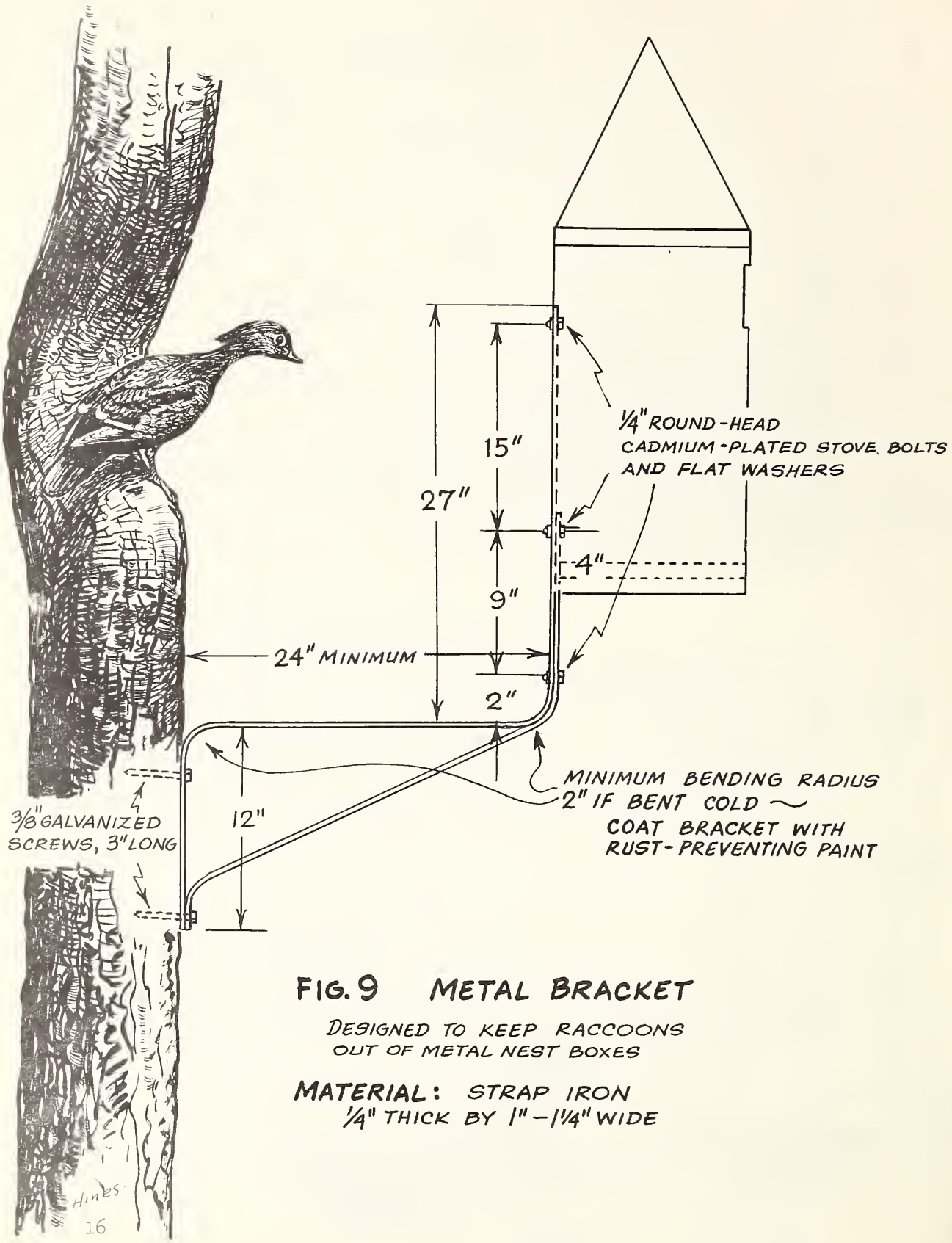

FIG. 9 METAL BRACKET

DESIGNED TO KEEP RACCOONS OUT OF METAL NEST BOXES

MATERIAL: STRAP IRON 1/4" THICK BY 1" – 1 1/4" WIDE

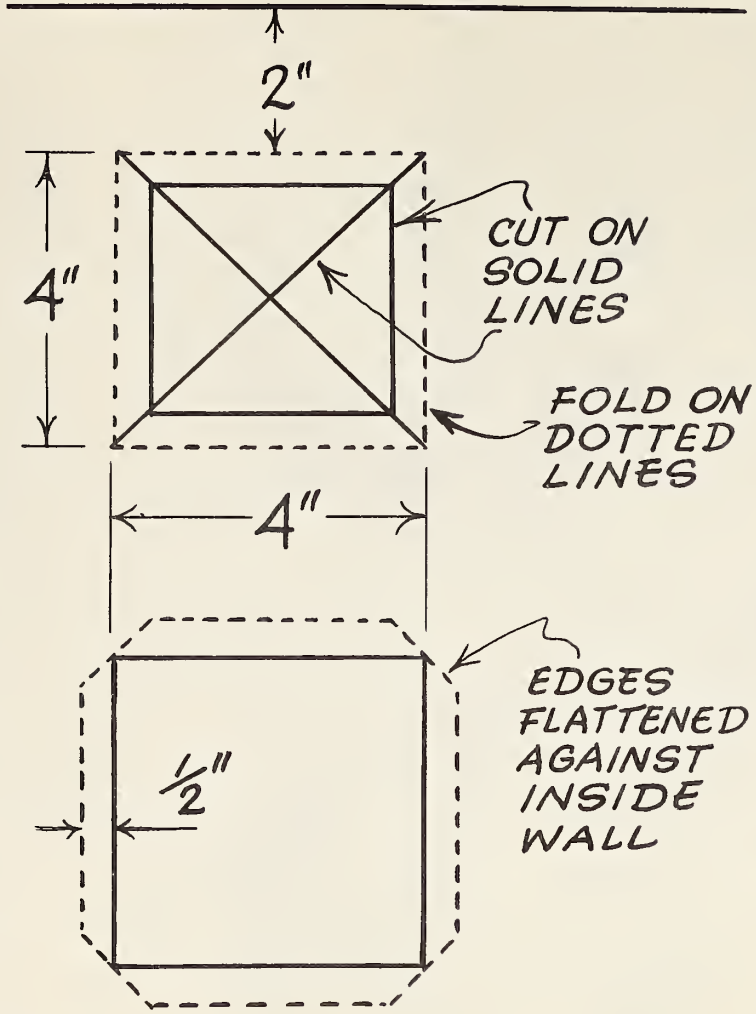

Fig. 10. An easily-made entrance which is suitable for metal nest boxes that are supported in such ways as to be raccoon-proof, as in Figs. 7 - 9.

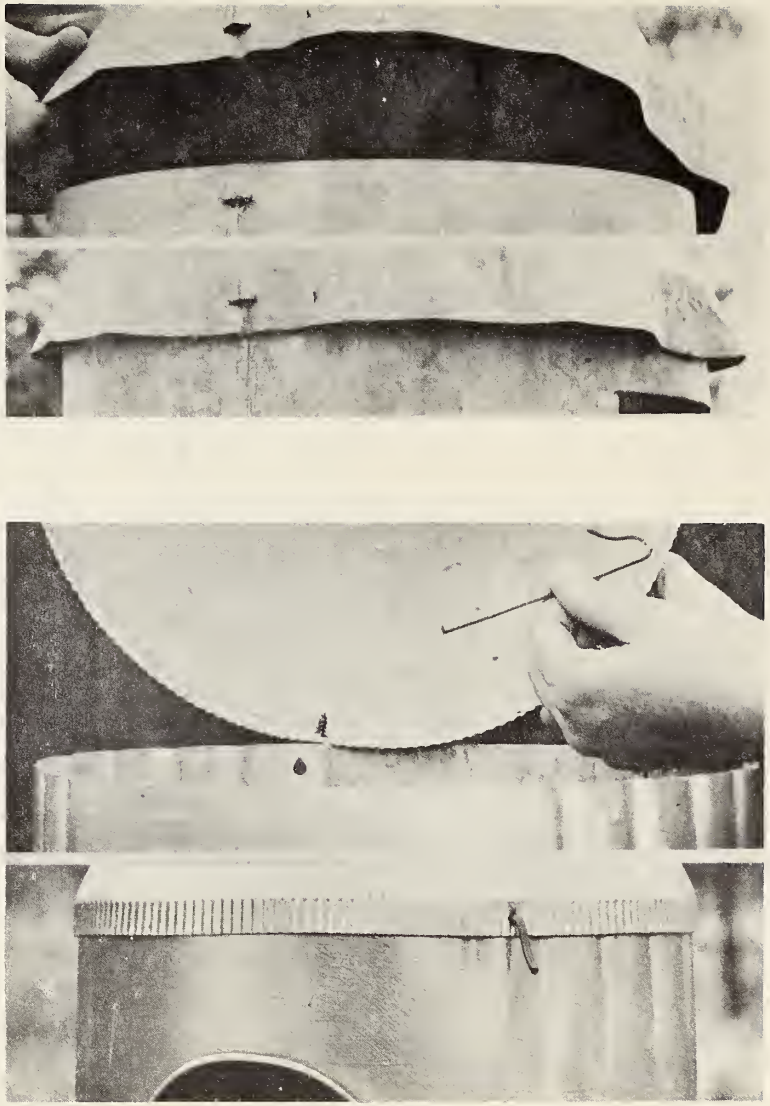

Fig. 11. Two simple methods of attaching the roof of a metal box. The roof is easily fastened in place or removed.

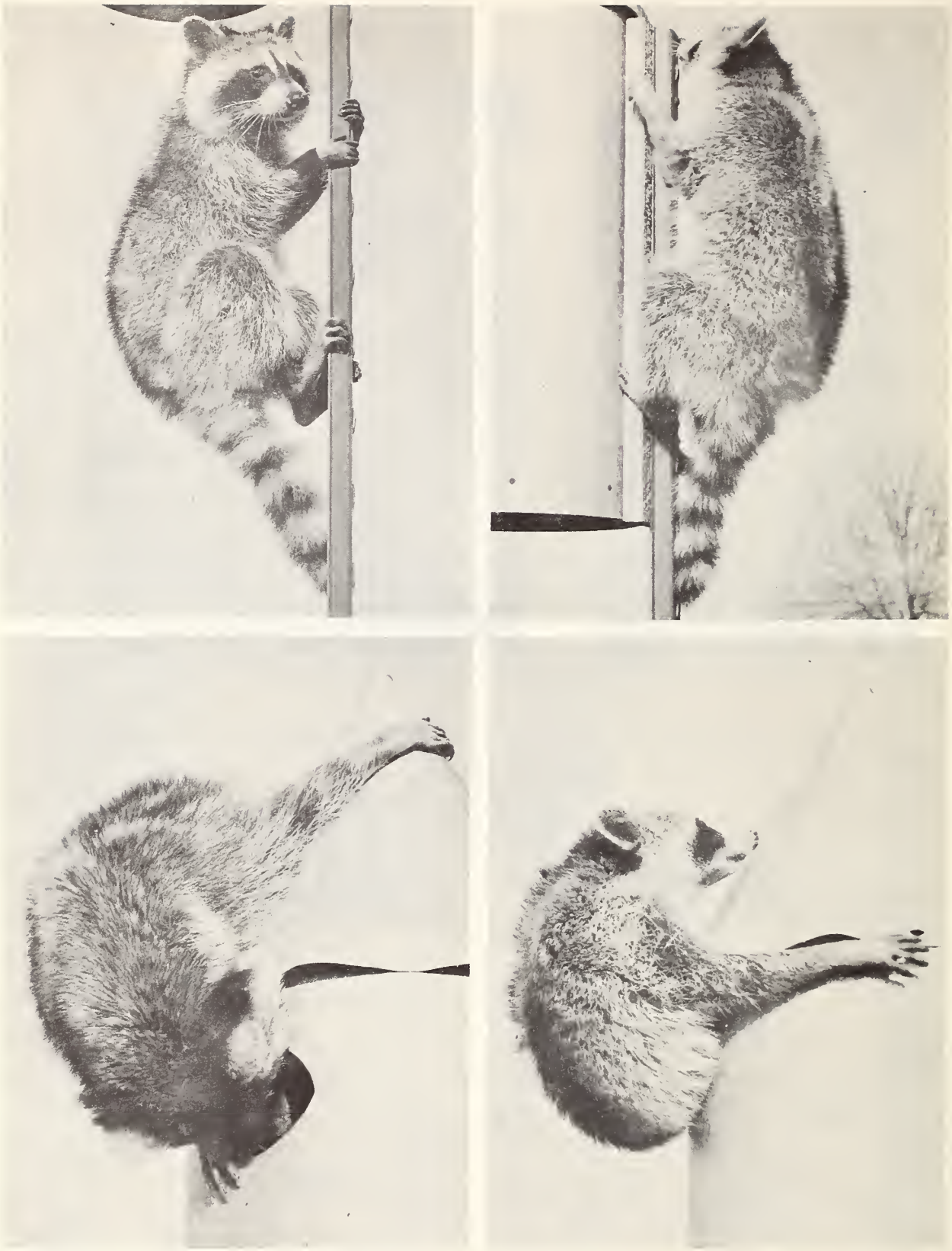

Fig. 12. A small, adult raccoon going up a metal post and wooden mounting board, then in and out of the 3- by 4-inch oval entrance of a metal nest box with conical roof. Without the board, which is unnecessary, he could not have climbed onto the box nor reached the entrance.

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